



## A First Case Study of a Life Cycle-Based Alternatives Assessment (LCAA)

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# ISES2017

# ABSTRACT BOOK



Integrating Exposure Science Across Diverse Communities

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INTERNATIONAL SOCIETY OF EXPOSURE SCIENCE

**MO-SY-F3-151****A First Case Study of a Life Cycle-Based Alternatives Assessment (LCAA)**

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**Abstract:** Chemical alternatives assessment (AA) is an emerging screening-level method to replace hazardous chemicals with safer alternatives. Current AA frameworks, however, suffer from gaps in addressing exposure and life cycle impacts, which can leave trade-offs unidentified. Exposure needs to cover various population groups including workers, consumers and the general public, while life cycle impacts need to focus on categories relevant for a given AA chemical-product application. We systematically define the scope of AA and identify key elements for quantitatively considering exposure and life cycle impacts. Our approach is evaluated in a case study, through which we outline future research needs to fully operationalize a consistent and Life Cycle-based Alternatives Assessment (LCAA). We build on a flexible mass balance-based modeling system yielding cumulative multimedia transfer fractions and exposure pathway-specific Product Intake Fractions defined as chemical mass taken in by humans per unit mass of chemical in a product. When combined with chemical masses in products and further with toxicity information, this approach is a resourceful way to inform AA. Our case study reveals that replacing DEHP by DIHP as vinyl flooring plasticizer shifts from cancer to non-cancer disease burden and shows that plasticizers contribute between 55 and 85% to total toxicity burden from flooring. Comparing toxicity-related outcomes with outcomes from other life cycle impacts emphasizes the relevance of toxicity impacts for this chemical-product application. Our results demonstrate (a) how assumptions used in different assessment methods can be aligned in a manner that can avoid contradictory results, (b) how all relevant life cycle impacts can be consistently considered and compared, thereby avoiding burden shifting that could result from disregarding chemical and product life cycles, and (c) how the most relevant impacts across all life cycle stages are prioritized.

Keywords: A-chemical alternatives, A-chemical prioritization, A-exposure models, A-life cycle analysis, C-consumer products

**MO-SY-F3-152****Suspect Screening and Non-Targeted Analysis of Coupled Soil and House Dust Samples**

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